Device for Suspending Articles or for Securing a Bearing Means

Field of the invention

The invention relates to a device for suspending articles or for securing a bearing means, with a plug-in sleeve, which can be inserted into a carrying structure and, in most applications, is encased in a sleeve holder, and a carrying arm, which can be engaged in the plug-in sleeve. Typical examples of carrying structures are panels, rear walls and supports. Such devices are used predominantly in shops and exhibitions for displaying goods. The articles displayed – e.g. items of clothing, accessories and packed goods – can be hung directly on the carrying arm or the carrying arm supports a bearing means, which may be, for example, in the form of a shelf, of a box or of a basket.

Prior art

For shop and trade-fair construction, a high level of variability, esthetically pleasing designs and cost-effectiveness are required of the devices used. According to EP 0 716 825 B1, plug-in sleeves are inserted individually, or in a methodically distributed manner, into a rear wall. The device comprises a plug-in sleeve and a carrying arm, which can be straightforwardly plugged into the plug-in mount and disengage therefrom. As a variant, it is possible for the plug-in sleeve to be positioned on the front side or rear side of a panel element, to be inserted into such a panel element or to be assembled on a rack element. The carrying arm has a plug-in plate and a rod part attached thereto. In the angled state, the plug-in plate can be introduced through the window-like plug-in opening into the housing and, following a slight displacement, can be arrested behind buffer edges. The rod part itself can be utilized for hanging goods or secures a goods carrier. It is also possible for a goods carrier to be seated on the rod parts of a plurality of adjacent carrying arms and/or for a plurality of rod parts to be connected by means of transverse rods. For this purpose, plug-in sleeves are arranged in a methodically distributed manner. This device continues to be successful, but is designed pre-

dominantly for square plug-in sleeves and requires a plug-in plate on the carrying arm.

The device according to WO 01/41604 A1 is based on the same principle, the plug-in opening being located in a sleeve component which is enclosed by a set-back positioning flange. In the assembled state, the positioning flange ends up located on the rear side of the carrying structure, while the sleeve component projects into an opening made in the carrying structure.

The arrangement according to WO 97/26809 A1 likewise comprises a plug-in sleeve, which is inserted directly into a rear wall or into a panel and into which a carrying rod can be plugged. The carrying rod, which is in the form of a tubular component, has a latching mechanism which is arranged in its plug-in end and has an actuable lever element with a movable catch which, in the plugged-together state, latches, for arresting purposes, into an engagement contour provided in the plug-in sleeve. In the case of the device according to WO 99/20094 A2, the carrying rod has, at the plug-in end, a hook contour which serves for fixing purposes, under the force of a leaf spring, in the plug-in sleeve. When the carrying rod is pushed in, a portion of the leaf spring which is contoured in a V-shaped manner latches into the hook contour on the carrying rod. The functioning of the device comprising a plug-in sleeve and a carrying rod according to WO 01/87123 A1 is similar. The hook contour, which is provided at the front end of the carrying rod, likewise comes into engagement with a spring element which is arranged inside the plug-in sleeve, but extends integrally from the plug-in sleeve, which is a plastic injection molding, as an elastically flexible tongue.

WO 01/43599 A1 also discloses a plug-in sleeve, which can be inserted into a carrying structure, and a carrying rod, which can be plugged into the plug-in sleeve. The plug-in sleeve has a plug-in opening which extends between a front entry and a rear boundary. At the top, the plug-in opening has a bevel, which slopes upward in the direction of the entry and thus forms a clearance at the top. At the bottom, the plug-in opening has an inclination, which slopes downward in the direction of the boundary and thus produces a clearance at the bottom. Inside,

the plug-in sleeve has a top undercut and the carrying rod has a tongue which can be plugged into the plug-in opening and has an upwardly directed hook, which is intended for engaging in the undercut.

Object of the invention

Taking the existing devices as the departure point, it is an object of the invention, while maintaining a plug-in sleeve and a load carrier which can be engaged therein, to improve, in particular, the rotational stability of the plugged-in carrying arm, which is relevant predominantly in the case of carrying arms of T-shaped configuration being subjected to a relatively high level of asymmetric loading. The inner configuration of the plug-in sleeve for fixing the plugged-in carrying arm is to be functionally reliable, so that the carrying arms are seated securely in the plug-in sleeves and appear precisely in alignment with one another. Even with a lot of activity taking place round about, the plugged-in carrying arm has to be arrested in a reliable manner, although the intention is for it to be easy to remove again with very straightforward handling.

A further object is to make it possible for the plug-in sleeve to be assembled efficiently in different types of carrying structure. The concern here is to incorporate load carriers, e.g. carrying arms, in a wide variety of different configurations, and the fitting of the load carriers with shelves, in the design, so that the interior designer has a wide range of possible variations and combinations for constructing esthetically pleasing arrangements.

A next object is to electrify the device, so that power which is channeled up via the plug-in sleeve passes, via the plugged-in load carrier, to a consuming unit, e.g. a luminaire.

The final object of the invention is to extend the range of devices of the generic type on offer. The device which is to be produced is to be capable of cost-effective mass production and assembly.

Overview of the invention

The device for hanging articles or for securing a bearing means is based on a plug-in sleeve and a load carrier, e.g. a carrying arm or a shelf, which can be fitted into this plug-in sleeve. The plug-in sleeve has a front plug-in opening which continues axially as a free space into the interior of the plug-in sleeve. The plug-in sleeve, which is intended for fastening directly or indirectly on a carrying structure, has an arresting contour on its inside. The load carrier has a plug-in part which is adapted for introducing into the plug-in opening and has a mating contour, which is provided for engagement with the arresting contour on the plug-in sleeve. Articles can be hung directly on the load carrier or can be placed on a bearing means supported by the load carrier.

The configuration of the plug-in part and plug-in sleeve forces the introduction of the plug-in part into the plug-in sleeve with the load carrier inclined in relation to the horizontal overall, the plug-in part being in a lowered position. The engagement between the arresting contour and the mating contour, as the locked stated, is achieved once the load carrier moves as a whole into the horizontal with the plug-in part located horizontally. The arresting contour is formed on the underside of the ceiling and/or on the side flanks of the housing of the plug-in sleeve. The mating contour is provided on the top side of the plug-in part and/or on the side flanks thereof, the arresting contour being designed as an elevation and the mating contour being designed as a recess.

Specific embodiments of the device are described hereinbelow: the arresting contour is arranged on both sides of the ceiling of the housing of the plug-in sleeve, at the transition to the side flanks of the latter, and the mating contour is located in the two side flanks of the plug-in part. The arresting contour on both sides preferably extends essentially from the ceiling and is directly adjacent to the side flanks of the housing of the plug-in sleeve. The mating contour is provided in the two side flanks of the plug-in part in each case as a recess which passes vertically all the way through and is set back in relation to the end, as a result of which an outer claw is produced in each case in the front corner regions of the plug-in part. The arresting contour on both sides begins, in the direction of the

front plug-in opening, with an inlet located on the same plane as the ceiling, and slopes up in a wedge-shaped manner in the opposite direction. The arresting contour terminates, toward the rear part of the housing of the plug-in sleeve, with a buffer edge. In the locked state, the two outer claws grip behind the associated buffer edge in each case.

The plug-in opening is of rectangular cross section and has a frame positioned around it in a flange-like manner. The plug-in part, at least to the extent where it is guided through the front plug-in opening, likewise has a rectangular cross section and is preferably made of metal. At least one stop surface, which limits the maximum push-in depth of the plug-in part, is provided inside the housing of the plug-in sleeve, in the rear region, which is located opposite to the front plug-in opening. Likewise inside the housing of the plug-in sleeve is at least one screw seat with a through-opening for the introduction of a fastening screw for fixing the plug-in sleeve. The plug-in sleeve is preferably produced as a single-piece metal casting or plastic injection molding.

At the rear end, which is located opposite the frame, the plug-in sleeve has a rear plug-in opening and retaining contours for the insertion of a first electrical coupling part with a cable routed up into place. The plug-in part has an aperture and retaining contours for the insertion of a second electrical coupling part, with a continuing cable for supplying power to a consuming unit, the two coupling parts, with the plug-in part pushed into the plug-in sleeve to the maximum extent, being intended for engaging mechanically and electrically with one another.

A sleeve holder is provided for accommodating the housing of the plug-in sleeve, this sleeve holder being intended for fastening on the carrying structure of the plug-in sleeve. The sleeve holder has, in the first instance, a housing, which is divided up into a front portion and a rear portion. There is a front plug-in opening, which is accessible from the front portion, and a rear plug-in opening, which is accessible from the rear portion. Flange-like extensions grip the housing at the transition between the front portion and rear portion. The sleeve holder also has at least one crosspiece, which is provided at the free end of the rear portion and has

a screw hole for the engagement of the threaded shank of the at least one fastening screw, which fixes the plug-in sleeve and has its head positioned in the screw seat.

The plug-in sleeve is intended for plugging through a through-passage in the panel element, the frame of the plug-in sleeve, this frame enclosing the front plug-in opening, being positioned on the front side of the panel element. The inserted plug-in sleeve is fixed by a sleeve holder, which accommodates the rear part of the plug-in sleeve. The extensions of the sleeve holder are provided with the screw holes therein for screwing on the rear side of the panel element or on a carrying structure erected behind the panel element. The front portion of the sleeve holder can project into the through-passage in the panel element.

As an alternative, the extensions of the sleeve holder, with the screw holes therein, can be utilized for screwing on an outer surface which is directed into space and belongs to a vertical support in the form of a hollow polygonal profile, this vertical support serving as a carrying structure. The rear portion of the sleeve holder then projects into the cavity of the vertical support, and the front portion of the sleeve holder projects into the through-passage in the panel element. Here, too, the frame of the plug-in sleeve, this frame enclosing the front plug-in opening, is positioned on the front side of the panel element.

The rod part of the carrying arm may be a round or quadrilateral tube which is rectilinear or curved or is angled one or more times. As an alternative, the rod part is a round or quadrilateral bar made of solid material. The rod part may bear a shelf which is supported by at least one retaining element, e.g. a transverse strut, at the front end and/or at the plug-in end. In a further configuration, the rod part bears a transverse rod at the front end, it being possible for the transverse rod to be additionally provided with a shelf.

The device according to the invention is distinguished by particular rotational stability even in the case of carrying arms of T-shaped configuration being subjected to a relatively high level of asymmetric loading. Furthermore, the plug-in

sleeve, together with the sleeve holder, can be inserted efficiently into different types of carrying structure. Also advantageous is the wide variety of possible configurations in respect of the carrying arms that can be inserted and the way in which they are fitted out. Finally, the device can be cost-effectively mass produced and assembled and, in the process, allows esthetically pleasing arrangements to be erected.

Brief description of the attached drawings

In the drawings:

Figure 1A: shows a side view of a construction comprising a first variant of a sleeve holder in a first application, inserted into the rear side of a panel element, and also comprising a plug-in sleeve accommodated therein and a plugged-in carrying arm;

Figure 1B: shows a horizontal section along line A–A from Figure 1A;

Figure 2A: shows, in perspective, a front view of a first variant of a plug-in sleeve;

Figure 2B: shows, in perspective, a rear view of the plug-in sleeve according to Figure 2A;

Figure 2C: shows, in perspective, a rear view, from beneath, of the plug-in sleeve according to Figure 2A;

Figure 3A: shows a plan view of a first variant of a plug-in part of a carrying arm with rod part attached;

Figure 3B: shows a side view of the plug-in part of a carrying arm with rod part attached according to Figure 3A;

Figure 4A: shows, in perspective, a front view of a first variant of a sleeve holder;

Figure 4B: shows, in perspective, a rear view of the sleeve holder according to Figure 4A;

Figure 4C: shows, in perspective, a rear view, from above, of the sleeve holder according to Figure 4A;

Figure 5A: shows, in perspective, an exploded illustration of a first variant of a sleeve holder according to Figure 4A, a first variant of a plug-in sleeve

according to Figure 2A, which has been moved up into close proximity, as seen in the assembly direction, and an associated screw;

Figure 5B: shows, in perspective, an exploded illustration of the construction according to Figure 5A, with a panel element introduced between the first variant of the sleeve holder and the first variant of the plug-in sleeve;

Figure 5C: shows an enlarged horizontal section of the first variant of the sleeve holder according to Figure 4A in a first application, inserted into the rear side of a panel element, with the first variant of the plug-in sleeve according to Figure 2A accommodated from the front side;

Figure 6: shows an enlarged horizontal section of the first variant of the sleeve holder according to Figure 4A in a second application, fastened on the front side of a carrying structure, with a panel element placed in front and the first variant of the plug-in sleeve according to Figure 2A accommodated in it;

Figure 7A: shows the bottom view of the plug-in sleeve of a first variant according to Figure 2A with, in close proximity, the first variant of the plug-in part of a carrying arm and rod part attached according to Figure 3A;

Figure 7B: shows the construction according to Figure 7A in the plugged-together state;

Figures 8A to 8C: show the functional principle of the device in the three positioning phases;

Figure 8A: shows the <u>first positioning phase:</u> an enlarged vertical section of the construction according to Figure 1A, with the first variant of the plug-in part of an inclined carrying arm moved up in close proximity to the first variant of the plug-in sleeve;

Figure 8B: shows the <u>second positioning phase:</u> the construction according to Figure 8A, with the plug-in part of the inclined carrying arm pushed into the plug-in sleeve to the maximum extent, in the unlocked state;

Figure 8C: shows the third positioning phase: the construction according to Figure 8B, with the plug-in part of the horizontally oriented carrying arm pushed into the plug-in sleeve to the maximum extent, in the locked state;

Figure 9A: shows, in perspective, a front view of a second variant of a plug-in sleeve;

Figure 9B: shows, in perspective, a rear view of the plug-in sleeve according to Figure 9A;

Figure 9C: shows, in perspective, a rear view, from beneath, of the plug-in sleeve according to Figure 9A;

Figure 9D: shows, in perspective, a different rear view, from beneath, of the plug-in sleeve according to Figure 9A;

Figure 10A: shows, in perspective, a front view of a second variant of a sleeve holder;

Figure 10B: shows, in perspective, a rear view of the sleeve holder according to Figure 10A;

Figure 10C: shows, in perspective, a rear view, from above, of the sleeve holder according to Figure 10A;

Figure 10D: shows, in perspective, a rear view, from beneath, of the sleeve holder according to Figure 10A;

Figure 11A: shows the bottom view of the second variant of a plug-in sleeve according to Figure 9A and, in close proximity, the first variant of a plug-in part of the carrying arm according to Figure 3A;

Figure 11B: shows an enlargement of the construction according to Figure 11A in the plugged-together state;

Figure 12A: shows, in perspective, an exploded illustration of a construction with a panel element introduced between the second variant of the sleeve holder according to Figure 10A and the second variant of the plug-in sleeve according to Figure 9A;

Figure 12B: shows a horizontal section of the sleeve holder according to Figure 10A in a first application, inserted into the rear side of a panel element, with the plug-in sleeve according to Figure 9A accommodated from the front side;

Figure 12C: shows a vertical section of the construction according to Figure 12B, with the carrying arm according to Figure 11A plugged in;

Figure 12D: shows a horizontal section of the construction according to Figure 12C;

Figure 13A: shows a horizontal section of the construction according to Figure 12B with the second variant of the sleeve holder in a third application, inserted into a vertical support;

Figure 13B: shows a horizontal section of the construction according to Figure 13A, with the carrying arm according to Figure 11A plugged in;

Figures 14A to 14C: show the functional principle of the device in the three positioning phases;

Figure 14A: shows the first positioning phase: a vertical section of the second variant of a sleeve holder according to Figure 10A, with the second variant of the plug-in sleeve according to Figure 9A inserted therein and, in close proximity, the first variant of the plug-in part of an inclined carrying arm according to Figure 11A;

Figure 14B: shows the second positioning phase: the construction according to Figure 14A, with the plug-in part of the inclined carrying arm pushed into the plug-in sleeve to the maximum extent, in the unlocked state;

Figure 14C: shows the third positioning phase: the construction according to Figure 14B, with the plug-in part of the horizontally oriented carrying arm pushed into the plug-in sleeve to the maximum extent, in the locked state;

Figures 15A to 22C: show the device for hanging articles or for securing a bearing means with electrification;

Figure 15A: shows, in perspective, a side view of the second variant of a plug-in sleeve according to Figure 9A with, in close proximity, a first coupling part and second clamp part from Figure 17;

Figure 15B: shows, in perspective, a front view of the construction according to Figure 15A in the assembled state;

Figure 15C: shows, in perspective, the top view of the construction according to Figure 15B;

Figure 15D: shows, in perspective, the bottom view of the construction according to Figure 15B;

Figure 16: shows a perspective view of the plug-in sleeve with the first coupling part inserted, as a construction according to Figure 15B, in close proximity to the second variant of a sleeve holder according to Figure 10A;

Figure 17: shows a perspective view of a clamp in complete form, with the two clamp parts still interconnected;

Figure 18A: shows a partial section of a vertical support with the second variant of the sleeve holder according to Figure 10A inserted therein, in the third application, with preassembled first coupling part, clamp and cable routed up into place;

Figure 18B: shows a perspective illustration of the construction according to Figure 12A, with the sleeve holder in the first application, and the first coupling part inserted into the plug-in sleeve and secured by means of the second clamp part;

Figure 18C: shows a partial section of the construction according to Figure 18A, with the second clamp part and plug-in sleeve moved up into place;

Figure 18D: shows a partial section of the construction according to Figure 18C, with the first coupling part inserted into the plug-in sleeve and secured by means of the second clamp part;

Figure 18E: shows a plan view of the construction according to Figure 18B;

Figure 19A: shows a plan view of a shelf with the second variant of the plug-in part, and second coupling part inserted therein, attached;

Figure 19B: shows the enlarged detail X1 from Figure 19A;

Figure 20A: shows the bottom view of a plug-in sleeve with the first coupling part inserted and secured by means of the second clamp part and, in close proximity, the second variant of the plug-in part with the second coupling part inserted therein, according to the detail X1 from Figure 19A;

Figure 20B: shows the bottom view of the construction according to Figure 20A in the plugged-together state;

Figure 20C: shows, on an enlarged scale, the perspective view, from beneath, of the construction according to Figure 20B;

Figure 21A: shows a vertical section of a sleeve holder according to Figure 10A in a first application, inserted into the rear side of a panel element, with the plug-in sleeve according to Figure 9A accommodated from the front side and the shelf according to Figure 19A secured therein, with electrification;

Figure 21B: shows a plan view of the construction according to Figure 21A;

Figures 22A to 22C: show the functional principle of the device with electrification in the three positioning phases;

Figure 22A: shows the <u>first positioning phase</u>
(electrical coupling parts are at a distance apart from one another):
a vertical section of the second variant of a sleeve holder according to Figure 10A, with the second variant of the plug-in sleeve according to Figure 9A inserted therein and, in close proximity, the second variant of the plug-in part of an inclined carrying arm;

Figure 22B: shows the <u>second positioning phase</u>
(electrical coupling parts illustrated just prior to engagement):
the construction according to Figure 22A, with the second variant of the plug-in part of the inclined carrying arm pushed into the plug-in sleeve to the maximum extent, in the unlocked state; and

Figure 22C: shows the third positioning phase
(electrical coupling parts are in engagement):
the construction according to Figure 22B, with the second variant of the plug-in part of the horizontally oriented carrying arm pushed into the plug-in sleeve to the maximum extent, in the locked state.

Exemplary embodiment

A detailed description will be given hereinbelow of exemplary embodiments of the device according to the invention in different applications and with design-modified components, first of all without, and then with, electrification.

The following applies to the rest of the description. If, in order to avoid ambiguity in the drawings, a figure contains designations which are not explained in the directly associated text of the description, then you are referred to the point at which they are mentioned in previous or subsequent descriptions of the figures. For reasons of clarity, components are not usually designated again in further figures, provided that it is clear from the drawings that they are "recurring" components.

Figures 1A and 1B

This pair of figures illustrates a construction which, in the first instance, comprises a first variant of a sleeve holder **3**, in a first application, and a first variant of a plug-in sleeve **1** accommodated therein. The sleeve holder **3** is inserted into a panel element **4**, by way of its housing **30**, from the rear side **41**. The plug-in sleeve **1** is accommodated in the sleeve holder **3** from the front side **40** of the panel element **4**, so that the frame **10** of the plug-in sleeve **1** ends up located on the front side **40**. The combination of sleeve holder **3** and plug-in sleeve **1** rests in a through-passage **42** provided in the panel element **4**. The wing-like extensions **31** of the sleeve holder **3**, in this first application, are fastened on the rear side **41** of the panel element **4**. The plug-in sleeve **1**, which is pushed into the sleeve holder **3**, is secured by means of an axially provided screw **39**.

In the locked, third positioning phase, a carrying arm **2** which is inserted into the plug-in sleeve **1**, has its rod part **20** extending, in principle, horizontally into space. The front end **21** of the carrying arm is particularly provided with a stopper nose **23** in order to avoid the situation where articles which are hung on the carrying arm, e.g. items of clothing hanging on hangers, slide down. Arranged at the plug-in end **22**, which is located opposite the front end **21**, is a first variant of a plug-in part **25**, which is flat in cross section and can be plugged, with arresting action, into the plug-in sleeve **1**. The plug-in part **25** and the plug-in opening **11** are preferably of rectangular cross section, this resulting in particularly good rotational stability. The rod part **20**, as a tube or bar made of solid material, may have round, oval, rectangular or square cross sections. In addition to the elongate, rectilinear geometry, the rod part **20** may be provided in the curved, stepped or angled forms which are typical for shop construction. In a further alternative, a transverse strut is fitted at the front end **21**, so that the carrying arm **2** assumes a T-shaped configuration. It is possible for a transverse strut to extend over the front ends **21** of a plurality of adjacent carrying arms **2**, this resulting in a frame-like combination of carrying arms. Articles can be hung directly on the rod part **20** of a carrying arm **2**. As an alternative, a bearing means may be arranged, as a shelf, basket or tray for bearing or displaying articles, on an individual rod part **20** or on the rod parts **20** of a plurality of adjacent carrying arms **2**.

Figures 2A to 2C

This series of figures shows different perspective views of a first variant of a plug-in sleeve **1**. On the front side, the plug-in sleeve **1** has a flat frame **10**, which encloses a window-like plug-in opening **11**. Attached to the rear side of the frame **10** is a housing **12** of reduced cross section, so that the frame **10**, in its plane, forms a flange-like projection on all sides. The housing **12** is basically in the form of a cuboid which has the plug-in opening **11** toward the front and is partially open toward the bottom and rear, i.e. the ceiling **13** is closed apart from a screw seat **161**, a ledge **16** projects into the rear side, which is located opposite the frame **10**, and a base section **15** is adjacent to the frame **10**, so that most of the base surface area is open. In the axial direction, the ceiling **13** and the base section **15** have guide contours **14**, preferably designed as grooves. The guide contours **14**

on the side flanks of the housing **12**, in contrast, are preferably elevated crosspieces. The axial through-opening **160** with the screw seat **161** extends through the ledge **16**. The ledge **16** has stop surfaces **162** directed into the interior of the housing **12**.

Provided on the underside of the ceiling **13**, adjacent to the side flanks of the housing **12** in each case, is an internal arresting contour **17** with an inlet **19**, which is directed toward the frame **10**, and a buffer edge **18**, which is directed toward the ledge **16**. The arresting contour **17** extends with wedge-like thickening from the inlet **19** – from the flat plane of the ceiling **13** – in the direction of the buffer edge **18**, so that the arresting contour **17** increases in height in the direction of the buffer edge **18**. The plug-in sleeve can be produced in a particularly advantageous manner by plastic injection molding.

Figures 3A and 3B

The first variant of the plug-in part **25** is fixed to the plug-in end **22** of the rod part **20** and has a cross section which complements the plug-in opening **11** of the plug-in sleeve **1** and is flat in the horizontal plane. The plug-in part **25** terminates with the free end **27**. Provided in the two side flanks of the plug-in part **25** is a respective mating contour **26**, which is set back from the end **27** and is preferably designed as undercut depressions in which, in the plugged-in state (see Figures 7B and 8C), the arresting contours **17**, of complementary dimensions, end up located. Outer claws **28** thus form in the corner regions in front of the two mating contours **26**, as seen in the direction of the end **27**. For subjecting the device as a whole to high loading, the entire carrying arm **2** with the plug-in part **25** will be produced from a material with corresponding load-bearing properties, e.g. steel.

Figures 4A to 4C

The first variant of the sleeve holder **3**, which is dealt with in this series of figures, with its housing **30** and the extensions **31** encasing the housing **30** in a wing-like manner serves for fixing a plug-in sleeve **1** which is inserted therein. Corresponding to the housing **12** of the plug-in sleeve **1**, the housing **30** has a plug-in ope-

ning **32** and an internal accommodating space. On the rear side of the housing **30**, that is to say located opposite the plug-in opening **32**, a centrally arranged vertical crosspiece **33** partially closes the rear exit from the housing **30**. A screw hole **34** is provided in the center of the crosspiece. The vertically positioned, angled extensions **31** define a vertical plane which is set back in relation to the plug-in opening **32** and from which the front portion **300** extends to the front and the rear portion **301** of the housing **30** extends to the rear. The extensions **31** contain a plurality of screw holes **310** which serve for fastening the sleeve holder **3** on the rear side **41** of a panel element **4**, in the first application, or in front of a carrying structure **5**, in the second application. In order to support relatively high loading, the extensions **31** extend beyond the housing **30** in the upward and downward directions.

Figures 5A to 5C

For assembling the first variant of the plug-in sleeve **1** and the first variant of the sleeve holder **3**, in the first application, the sleeve holder **3** is positioned, by way of its two extensions **31** on the rear side **41** of a panel element **4**, so that the front portion **300** of the sleeve holder **3** projects into an appropriately dimensioned through-passage **42** in the panel element **4**, while the rear portion **301** of the sleeve holder **3** projects away from the rear side **41** of the panel element **4**. The extensions **31** are fastened by means of screws **38** which engage through the screw holes **310** into the panel element **4**. From the front side **40** of the panel element **4**, the plug-in sleeve **1** is pushed into the plug-in opening **32** of the sleeve holder **3** – with the housing **12** in front, the ceiling **13** upward and the base section **15** downward – until the flange-like frame **10** of the plug-in sleeve **1** is positioned on the front side **40** and, in the process, covers over the border of the through-passage **42**.

A screw **39** is introduced in order to secure the plug-in sleeve **1** accommodated in the sleeve holder **3**, the head **390** of the screw ending up located in the screw seat **161** of the ledge **16** of the plug-in sleeve **1**, and its threaded shank **391** projecting through the through-opening **160** and engaging in the screw hole **34** of the rear crosspiece **33** in the sleeve holder **3**. The sleeve holder **3** and plug-in

sleeve **1** are thus assembled, so that the plug-in opening **11** of the plug-in sleeve **1** is thus ready for the introduction of the plug-in part **25** of a carrying arm **2** from space in the direction of the front side **40** of the panel element **4**. Panel elements **4** of different thicknesses can be used for the sleeve holder **3** with the front portion **300** of a certain length, so that the front edge of the front portion **300** in the through-passage **42** extends, at most, as far as the front side **40** of the panel element **4** or, in the case of a smaller panel thickness, ends up located in a set-back position in the through-passage **42**.

Figure 6

In the case of the alternative, second application of the first variant of the sleeve holder **3**, the latter, rather than being screwed to the rear side **41** of the panel **4**, is fastened by way of its extensions **31**, preferably once again by means of screws **38**, on a carrying structure **5** arranged on the rear side of the panel element **4**. Such a carrying structure **5** could comprise, for example, two spaced-apart struts, between which the sleeve holder **3** is accommodated, or a framework component with an aperture for the insertion of the rear portion **301** of the sleeve holder **3**. Here, too, the front portion **300** of the sleeve holder **3** is introduced into a complementary through-passage **42** and, depending on the thickness of the panel element **4** used, penetrates into the same, but at most into the plane of the front side **40**. In the same way as with the first application, the plug-in sleeve **1** is pushed into the plug-in opening **32** of the sleeve holder **3** – with the housing **12** in front, the ceiling **13** upward and the base section **15** downward – from the front side **40** of the panel element **4** until the frame **10** of the plug-in sleeve **1** ends up resting on the front side **40** and covers the border of the through-passage **42**.

Figures 7A and 7B

This pair of figures illustrates the form-fitting engagement of the first variant of the plug-in part **25** of the carrying arm **2** introduced into the end position in the first variant of the plug-in sleeve **1**. In the initially unoccupied state, the plug-in opening **11** of the plug-in sleeve **1** and the arresting contours **17** on the underside of the ceiling **13** and also the stop surfaces **162**, which are located opposite the plug-in opening **11** inside the plug-in sleeve **1**, are free (see Figure 7A).

Once the carrying arm **2** has been introduced into the plug-in sleeve **1** with the plug-in part **25** in front, and the carrying arm **2** oriented basically horizontally, the two arresting contours **17**, passing from the inlet **19** to the buffer edge **18**, end up located entirely in the complementary, cut-out mating contours **26** of the plug-in part **25**. The two outer claws **28** are seated behind the buffer edges **18**. The end **27** of the plug-in part **25** is positioned in front of the stop surfaces **162** and the rest of the plug-in part **25** extends out of the plug-in sleeve **1**, through the plug-in opening **11** thereof, and merges into the rod part **20** of the carrying arm **2**.

Figures 8A to 8C

This series of figures explains the functional principle of the device, which, in the respectively first variant of the plug-in sleeve **1** and of the sleeve holder **3**, is not electrified, in the three characteristic positioning phases.

First positioning phase: inclined position of close proximity (Figure 8a)

In preparation for the insertion of the carrying arm **2** into the unoccupied plug-in sleeve **1**, its plug-in part **25**, on which are located the two mating contours **26** and the respectively adjacent outer claws **28**, is moved up, with the end **27** in front, into close proximity with the free plug-in opening **11**, which is accessible from the front side **40** of the panel element **4** and is enclosed by the frame **10**. It is likewise the case that the two arresting contours **17** with the respective inlet **19** and the buffer edge **18** on the underside of the ceiling **13** of the housing **12** are still unoccupied and project freely into space. It is also the case that the stop surfaces **162** inside the plug-in sleeve **1**, the stop surfaces being provided on the ledge **16**, are free. The carrying arm **2** has to be inclined in relation to the horizontal overall, with the plug-in part **25** in a lowered position and the front end **21** of the rod part **20** in a raised position (see Figure 1A).

The plug-in sleeve **1** is oriented horizontally in the panel element **4**, the assembly which is shown here corresponding to the first application (see Figures 5B and 5C), i.e. the sleeve holder **3** is fastened, by way of its extensions **31**, on the rear side **41** of the panel element **4**. The front portion **300** of the housing **30** of the

sleeve holder **3** projects from the rear side **41** of the panel into the through-passage **42**. The plug-in sleeve **1** is fastened in the sleeve holder **3** by means of the screw **39**, of which the head **390** is seated in the ledge **16** and the threaded shank engages in the screw hole **34** in the crosspiece **33**.

Second positioning phase: Unlocked state (Figure 8B)

The plug-in part **25**, with the end **27** of the inclined carrying arm **2** in a lowered position, is pushed in through the plug-in opening **11**, beyond the base section **15**, until the end **27** rests against the stop surfaces **162**. As the plug-in part **25** is pushed in, those surfaces of the outer claws **28** which are directed toward the arresting contours **17** move along first of all beneath the two inlets **19** and then gradually beneath the two wedge-shaped arresting contours **17**. The outer claws **28**, which usually slide along the arresting contours **17**, force the still-inclined position of the carrying arm **2** as a whole to be maintained. The maximum push-in depth of the plug-in part **25** is thus achieved and, at the same time, the two mating contours **26**, provided on the side flanks of the plug-in part **25**, and the outer claws **28** are positioned congruently beneath the two complementary arresting contours **17**.

Third positioning phase: Locked state (Figure 8C)

Starting from the second positioning phase according to Figure 8B, the plug-in part **25**, pushed into the plug-in sleeve **1** to the maximum extent, with the adjoining rod part **20**, which extends between its plug-in end **22** and front end **21** and, along with the plug-in part **25**, produces the carrying arm **2**, is moved out of the inclined position, as a whole, into the horizontal. In this case, the two arresting contours **17** pass into the mating contours **26**, as a result of which the outer claws **28** of the plug-in part **25** grip behind the buffer edges **18** on the plug-in sleeve **1**. The end **27** of the plug-in part **25** comes into increased contact with the stop surfaces **162**. The weight of the carrying arm **2** and any load hanging thereon – by virtue of resting on the underside of the plug-in opening **11** so as to be capable of pivoting to a limited extent – results in the plug-in part **25** being pushed to an increased extent in the direction of the ceiling **13** of the plug-in sleeve **1** and thus in

the locked state being secured to a relatively pronounced extent, the action of the carrying arm **2** being pulled out of the plug-in sleeve **1** being blocked.

Removal of the carrying arm from the plug-in sleeve

The removal of the carrying arm **2** with the plug-in part **25** engaged in the plug-in sleeve **1** takes place in a reversible manner with a return from the third positioning phase into the second positioning phase, as a result of which the plug-in part **25** ends up the unlocked state again, from which the plug-in part **25** with the carrying arm **2** can be pulled out of the plug-in sleeve **1**.

Figures 9A to 9D

The second variant of the plug-in sleeve **1**, in turn, comprises the housing **12** and the frame **10** placed in front of it, the frame enclosing the front, window-like plug-in opening **11**, which terminates as a rear plug-in opening **11'**. Likewise present are the ceiling **13**, the guide contours **14**, the base section **15** and the arresting contours **17** on both sides – each with a buffer edge **18** and inlet **19**. As a modification to the first variant, instead of the previously centrally arranged ledge **16** with the through-opening **160** and screw seat **161**, in this case a respective ledge **16** with through-opening **160** and screw seat **161** is provided on the inside adjacent to the two side flanks of the housing **12**. This results in a rear plug-in opening **11'** in the center of the housing. Arranged in front of the two screw seats **161**, as seen in the direction of the frame **10**, is a respective passage **163** which is in the form of a half-shell and of which the elevation toward the frame **10**, directed from the ceiling **13** into the interior of the housing **12**, contains the stop surface **162**. The two through-openings **160**, screw seats **161**, stop surfaces **162** and passages **163** are located on parallel lines which cross over the connection between the front and rear plug-in openings **11,11'** at right angles. A hole **141** is located in the ceiling **13**, in the region of the connecting line between the two stop surfaces **162**. A head **390** of a screw **39** is positioned in each of the screw seats **161**, the threaded shank **391** of this screw projecting through the associated through-opening **160**. A nose **142** is located on the outside of the ceiling **13**, at the transition to the frame **10**, in a central position on the housing **12**. The plug-in sleeve **1** is advantageously produced as a single-piece casting. On the inner

sides, which are directed toward the rear plug-in opening **11'**, each ledge **16** has a blind groove **166** which is open in the upward direction.

Figures 10A to 10D

The second variant of the sleeve holder **3** likewise has a housing **30** of complementary form for accommodating the plug-in sleeve **1**, the extensions **31** in this case, rather than being attached laterally in a wing-like manner to the housing **30**, being provided as a flange which is located in a vertical plane and has a relatively long downward part **35** and an upward part **35'**. The downward and upward parts **35,35'** are attached to the housing **30** at the top and bottom and divide it up into the relatively long rear portion **301** and the shorter front portion **300**. The downward and upward parts **35,35'** contain first and second screw holes **310,311**. A leveling marking **312** is provided on the front surface of the downward part **35**, in a central position beneath the front portion **300**. The front portion **300** terminates at the front with the front surface **302**, which has a respective marking protuberance **303** extending from each of its corners and which encases the plug-in opening **32**. In the top longitudinal strip, a knot **304** is introduced into the front surface **302**. The rear plug-in opening **32'** opens out at the free end of the rear portion **301**, the two plug-in openings **32,32'** being open all the way through in relation to one another. For stiffening purposes, ribs **36** and a transverse rib **36'** are provided on the rear side of the upward and downward parts **35,35'**, and extend onto the housing **30**. To complement the outer ledges **16** with the through-openings **160** on the plug-in sleeve **1**, the sleeve holder **3** has a crosspiece **33** at the free end of the rear portion **301**, to the sides of the rear plug-in opening **32'** in each case, a screw hole **34** with internal thread extending through the crosspiece.

Figures 11A and 11B

This pair of figures illustrates the second variant of a plug-in sleeve **1** interacting with the first variant of a plug-in part **25** of a carrying arm **2**. As has already been explained in relation to Figures 3A and 3B, the plug-in part **25** is intended for pushing into the plug-in sleeve **1** with arresting action and has, at the front, the end **27**, in the front corner regions, the outer claws **28** and, on the side flanks, the cut-out mating contours **26**. Opposite the end **27**, the plug-in end **22** of the rod

part **20** of the carrying arm **2** is connected to the plug-in part **25**. Prior to the plug-in part **25** being introduced into the front plug-in opening **11**, the two are aligned with one another (see Figure 11A). For continuation of assembly, the heads **390** of the screws **39** are located in the screw seats **161**, and the threaded shanks **391** project out of the through-openings **160**. Prior to a carrying arm **2** being moved up into close proximity, the front plug-in opening **11** and the passages **163** provide access for a screwing tool, in order to screw the screws **39** into the screw holes **34** of the sleeve holder **3**.

In the fully pushed-in and arrested state, the arresting contours **17** end up located within the mating contours **26**, the end **27** resting against the stop surfaces **162** and the outer claws **28** enclosing the front buffer edges **18** of the arresting contours **17**. Depending on its length, the inlet **19** of the respective arresting contour **17** will project beyond the mating contours **26** or end up located therein (see Figure 11B). Bevels or rounded portions on the outer claws **28**, the mating contours **26** and the buffer edges **18** facilitate the introduction of the plug-in part **25** and prevent injury during handling, as a result of sharp edges being avoided.

Figures 12A to 12D

In the first application, provision is made for the sleeve holder **3** to be fastened, by way of its flange-like extension **31**, on the rear side **41** of a panel element **4**. This is done by means of screws **38** which engage, by way of their threaded shank **381**, through screw holes **310,311** in the extension **31** into screw holes **43** in the panel element **4**, the screw heads **380** being positioned on the rear side of the extension **31**. In the assembled state, the front portion **300** of the housing **30** projects into the through-passage **42** without projecting on the front side **40** of the panel element **4**. The plug-in sleeve **1** has its housing **12** pushed through the plug-in opening **32**, into the housing **30** of the sleeve holder **3**, to the maximum extent, so that the frame **10** rests on the front side **40** of the panel element **4** and the nose **142** of the plug-in sleeve **1** moves into the notch **304** on the sleeve holder **3**. For fastening the plug-in sleeve **1**, the screws **39** are screwed into the screw holes **34** by way of their threaded shanks **391**. The rear portion **301** of the sleeve holder **3** extends horizontally from the rear side **41** of the panel element **4**.

In the case of the non-electrified embodiment here the blind grooves **166**, the hole **141** and the rear plug-in opening **11'** on the plug-in sleeve **1** and the rear plug-in opening **32'** on the sleeve holder **3** remain unoccupied. The front plug-in opening **11**, which is directed into space, is ready for accommodating a plug-in part **25** with adjoining carrying arm **2**.

Figures 13A, 13B and 18A

These Figures show the second variant of the sleeve holder **3** in its third application, inserted into a vertical support **6**. Corresponding to the dimensions of the cross section of the housing **30** and of the ribs **36** and transverse ribs **36'**, an aperture is provided in the first outer surface **61** of the vertical support **6**, so that, of the sleeve holder **3** which is mounted thereon, the rear portion **301** projects into the interior of the vertical support **6** and the flange-like extension **31** is positioned, by way of its rear side, on the outer surface **61**. The extension **31** is fastened on the vertical support **6** by means of screws **319** which grip through the screw holes **310**. From the extension **31**, the front portion **300** of the housing **3** projects, in the first instance, into space, it being the case, in the completed construction, that a panel element **4** with a through-passage **42** is positioned in front of the vertical support **6** and the front portion **300** projects into the same. The housing **12** of the plug-in sleeve **1** is pushed into the front plug-in opening **32** of the sleeve holder **3** until the frame **10** is positioned on the front side **40** of the panel element **4**. The plug-in sleeve **1** pushed into the sleeve holder **3** is secured, in turn, by means of screws **39**, as has been described above. The front plug-in opening **11**, in turn, is ready for accommodating a plug-in part **25**.

The vertical support **6** is a hollow quadrilateral profile with the front surface **61**, the adjacent side surfaces **62**,**64** and the outer surface **63**, which is located between the side surfaces. The vertical support **6** is retained on a building wall, for example, by means of a fastening strut **60**, which is fixed to the side surface **62** by screws **69**.

Figures 14A to 14C

This series of figures shows the functional principle of the device, which, in the respective second variant of the plug-in sleeve **1** and of the sleeve holder **3** in combination with the first variant of the plug-in part **25**, is not electrified, in the three characteristic positioning phases, many points in the handling sequence here corresponding to the handling sequence for a device with the first variants of all the components **1,3,25**, as has been described in relation to Figures 8A to 8C. The first positioning phase (see Figure 14A), in turn, illustrates a carrying arm **2** with the plug-in part **25**, which terminates at the front with the end **27**, being moved up into close proximity in an inclined position. In the second positioning phase (see Figure 14B), the plug-in part **25** is located on the stop surfaces **162** by way of the lowered end **27** of the now inclined carrying arm **2**, the wedge-shaped arresting contours **17** still being located outside the mating contours **26**. In the third positioning phase (see Figure 14C), the carrying arm **2** has been moved into the horizontal, so that the arresting contours **17** are then enclosed by the mating contours **26** and the carrying arm **2** is thus secured, with arresting action, against being pulled out.

Figures 15A to 15D and 17

The rest of the figures up to the final figure, Figure 22C, inclusive illustrate the device with, in each case, the second variant of the plug-in sleeve **1**, the sleeve holder **3** and the plug-in part **25** provided with electrification. In anticipation of the assembly sequence, the positioning of the first coupling part **7** in the plug-in sleeve **1** is described in this sequence of figures. A cable **K** is routed up to the first coupling part **7** from the rear, while the contacts **73**, which are electrically screened in the manner of a conventional plug connector, are accessible from the front. On the sides, the first coupling part **7** has a respective journal **70** with an axial hole **71**, the two journals **70** being aligned with one another. A hole **72** extends through the first coupling part **7** from above.

With the insertion of the first coupling part **7** into the plug-in sleeve **1**, the coupling part **7** is positioned basically vertically, so that the journals **70** can be moved into the blind grooves **166**. Once the coupling part **7** has then been rotated through

approximately 90°, it ends up located horizontally in the plug-in sleeve **1**, in which case the fed cable **K** projects out of the rear plug-in opening **11'** and the contacts **73** are accessible from the vanishing line of the front plug-in opening **11**. In order to secure the coupling part **7**, which can be moved to a limited extent about the journals **70**, the second clamp part **96** has been plugged on, this clamp part engaging into the hole **141** in the housing **12** by way of its pin **97** and into the hole **72** on the coupling part **7** by way of its pin **98**.

The second clamp part **96** forms the clamp **9** together with the first clamp part **91**, which is initially interconnected, it being possible for the clamp parts **91**,**96** to be separated from one another by being broken or cut along a line **90**. The first clamp part **91** has, in its central region, two grooves **92** which are open in the downward direction and are intended for the through-passage of two cores of the cable **K**. The clamp **9** is preferably produced as a plastic injection molding.

Figure 16

This figure shows the plug-in sleeve **1**, with the first coupling part **7** inserted, in close proximity to a sleeve holder **3**, in order for the plug-in sleeve **1** to be introduced into the latter and fastened there. The cable **K** extending from the coupling part **7** is introduced into the sleeve holder **3**, through the front plug-in opening **32** of the latter, and passes out again at the rear plug-in opening **32'**, in order to be connected to the power supply. Once the plug-in sleeve **1** has been pushed into the sleeve holder **3**, with the cable **K** being pushed back simultaneously, the plug-in sleeve **1** is fixed in the sleeve holder **3** by means of the screws **39**.

Figures 18A to 18E

The sequence of Figures 18A, 18C and 18D illustrates the assembly of the plug-in sleeve **1** with the first coupling part **7** in combination with the third application of the sleeve holder **3**. The cable **K**, which is fed through the rear plug-in opening **32'**, has been connected to the first coupling part **7**, it being the case, in the first instance, that the cable **K** and the coupling part **7**, with the clamp **9** plugged on, are restrained in the sleeve holder **3** in order to prevent any slipping out through

the rear plug-in opening **32'**. In this securing position, the first clamp part **91** rests against the crosspieces **33** from the inside, the cable cores run through the grooves **92**, the coupling part **7** is seated in front of the clamp part **91**, and the pin **98** of the second clamp part **96** engages laterally in the hole **71** of a journal **70**. Prior to the coupling part **7** being inserted into the plug-in sleeve **1**, the coupling part **7**, with the clamp **9**, is pulled out through the front plug-in opening **32** (see Figure 18A).

In the next assembly step, the clamp **9** is removed from the cable **K**, and the first clamp part **91** is detached and can be disposed of. Thereafter, the coupling part **7** is fitted into the blind grooves **166** by way of its journals **70** (see Figure 18C) and the first coupling part **7** is secured on the plug-in sleeve **1** by the second clamp part **96**, whereupon the plug-in sleeve **1** can be pushed into the sleeve holder **3** (see Figure 18D).

The series of Figures 18B and 18E illustrates the assembly of the plug-in sleeve **1** with the first coupling part **7** in combination with the first application of the sleeve holder **3**, i.e. in combination with the latter being fastened, by way of the extension **31**, on the rear side **41** of a panel element **4**. Provided in the panel element **4**, to complement the vertical cross section of the front portion **300** of the housing **30**, is the through-passage **42** in which, in the assembled state, the front portion **300** ends up located and through which the plug-in sleeve **1**, provided with the coupling part **7**, is pushed into the sleeve holder **3** from the front side **40**. Irrespective of the thickness of the panel element **4**, the front portion **300** should not project beyond the front side **40**. The rear portion **301** of the sleeve holder **3** projects from the rear side **41**. With the device in the assembled state, the cable **K** projects out of the rear plug-in opening **32'** and extends further to the power supply.

Figures 19A and 19B

Taking the electrification into account, the second variant of the plug-in part **25** is provided with a second coupling part **8**, this plug-in part being adjoined by a shelf **2'** rather than a carrying arm **2**, as has been the case up until now. From the end **27** the plug-in part **25** contains an aperture **250** which continues axially as a

narrowed channel **251**, as a result of which the plug-in part **25** is basically subdivided into two legs which are located in a mirror-inverted manner in relation to one another. As before, the plug-in part **25** has the two outer claws **28** and the following mating contours **26**. From the aperture **250**, a blind groove **256** extends into each leg, the blind groove not being continuous from top to bottom, so that the journals **80** of the coupling part **8** can be fitted therein in an analogous manner to the way in which the journals **70** of the coupling part **7** are fitted into the blind grooves **166** on the plug-in sleeve **1**. The electrically screened contacts **83** of the coupling part **8** are accessible from the front, while a line (not illustrated) extends from the rear of the coupling part **8** and makes its way through the channel **251**, e.g. to a lamp.

Figures 20A to 20C

This series of figures illustrates the interengagement of the two coupling parts **7,8** when the plug-in part **25** is pushed into the plug-in sleeve **1**. In the state in which the plug-in part **25** – with the adjoining shelf **2'** – is in close proximity to the plug-in sleeve **1**, the coupling parts **7,8** are at a distance apart from one another, but the contacts **73,83** on both sides are already aligned with one another (see Figure 20A). The journal **97** of the second clamp part **96** and the pin **98** thereof plug into the housing hole **140** and the journal hole **72** and thus secure the inserted first coupling part **7** in the plug-in sleeve **1**.

As the plug-in part **25** is increasingly pushed into the plug-in sleeve **1**, the contacts **73,83** on both sides approach one another and the mating contours **26** move gradually onto the upwardly sloping arresting contours **17** (see Figure 20C).

When the plug-in part **25** has been pushed all the way into the plug-in sleeve **1** – the end **27** of the plug-in part butting against the stop surfaces **162** – the contacts **73,83** move all the way into one another, even when the end **27** of the now inclined shelf **2'** is still in the lowered position, and make the electrical connection. As the shelf **2'** is oriented horizontally, the arresting contours **17** pass into the mating contours **26** and the two coupling parts **7,8** are aligned with one another (see Figure 20B).

Figures 21A and 21B

This pair of figures shows, in the electrified embodiment – as a supplement to the construction according to Figures 12A to 12D – a sleeve holder **3** in the first application, fastened on the rear side **41** of the panel element **4**, with the plug-in sleeve **1** accommodated from the front side **40** of the panel and the plug-in part **25**, which is adjoined by a shelf **2'**, pushed therein. The plug-in sleeve **1** is provided with a first coupling part **7**, which is fed power via the cable **K**. The associated plug-in part **25** may be designed in accordance with the second variant of Figure 19B and be provided with a second coupling part **8**. If it is desired to dispense with the connection of an electrical consuming unit, the second coupling part **8** is done away with or the first variant of a plug-in part **25** according to Figure 3A could be used.

Figures 22A to 22C

This series of figures illustrates the functional principle of the device, which, in the respective second variant of the plug-in sleeve **1** and of the sleeve holder **3** in combination with the second variant of the plug-in part **25**, is now electrified, in the three characteristic positioning phases. Many points in the handling sequence here correspond to the handling sequence for a device with the first variants of all the components **1,3,25** – as has been described in relation to Figures 8A to 8C – and also with the second variants of all the components **1,3,25** without electrification, as per the description relating to Figures 14A to 14C.

The first positioning phase (see Figure 22A) thus shows, once again, a carrying arm **2** with the plug-in part **25**, which terminates at the front with the end **27**, but now has the second coupling part **8** projecting beyond it toward the front, being moved up into close proximity in an inclined position. The first coupling part **7**, which is seated in a plug-in sleeve **1**, is at a distance apart from the second coupling part **8**, so that there is no initial mechanical engagement, nor is any electrical contact made. In the second positioning phase (see Figure 22B), the plug-in part **25** is located on the stop surfaces **162** by way of the lowered end **27** (not visible here) of the now inclined carrying arm **2**, and the wedge-shaped arresting

contours **17** are still located outside, and above, the mating contours **26**. The coupling parts **7**,**8** here have been pushed mechanically one inside the other to the maximum extent and are in electrical contact with one another. In the third positioning phase (see Figure 22C), the carrying arm **2** has been moved into the horizontal, as a result of which the mating contours **26** move onto the arresting contours **17** and enclose the latter. At the same time, the two coupling parts **7**,**8** are aligned with one another. The carrying arm **2** is now secured against being pulled out.